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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/082,113

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Shoichi Hirota

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EXAMINER

DI GRAZIO, JEANNE A

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/082,113

Applicant(s)

HIROTA ET AL.

Examiner

Jeanne A. Di Grazio

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-16 and 18-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-16 and 18-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims

Dependent claims 2 and 17 have previously been canceled. Claims 1, 3-16 and 18-37 are pending per Response of February 3, 2006. No claims have been amended.

Priority

Priority to Japanese Patent Application No. 2001-298974 (Sept. 28, 2001) is claimed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 13, 16, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,278,327 (to McMahon et al.).

As to claims 1, 13, 16, 30 and 31: McMahon teaches and discloses liquid crystal matrices. Figures 1 and 3 shows a cross sectional view of operation of the McMahon invention in which glass substrates (1 and 5) enclose a layer of liquid crystal material (4)(Applicant's "a reflection substrate, a transparent substrate and a liquid crystal layer interposed between said two substrates."). McMahon shows electrode films (2 and 3) formed on inner surfaces of the two substrates (Applicant's "wherein a plurality of pixels and active elements for driving the liquid crystal at the plurality of pixels, are incorporated to at least one of the two substrates."). Please

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note that McMahon incorporates reflector means for re-directing light (Applicant's "a reflection substrate.").

McMahon also teaches directions of incident and refracted light beams as a function of liquid crystal material orientation and applied voltage (See Figure 1 and Column 6, Lines 5-68)(Applicant's "an optical axis of incident light beam upon the liquid crystal layer and an optical axis of an emergent light beam from the liquid crystal layer are present in a plane which is substantially perpendicular to a direction of orientation of liquid crystal molecules on the two substrates and the incident light impinges upon the liquid crystal layer in a direction which is inclined by a predetermined angle to the direction of the normal line of the substrate.").

The embodiments of Figures 1 and 3 do not appear to explicitly specify direction of polarization of incident light as a function of orientation of the liquid crystal molecules.

However, McMahon modifies the prior art of Figures 1 and 3 and with regard to Figures 5 and 6A-6D, for example, discusses change in polarization of light as a function of liquid crystal orientation (See Column 10, Lines 1-66, for example).

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon to solve the problem of the prior art, that of providing optical switching structures that function efficiently in a manner independent of the polarization of the input light (Column 8, Lines 1-20).

Thus, claims 1, 13, 16, 30 and 31 are rejected.

Claims 3-6 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over 4,278,327 (to McMahon et al.) and further in view of United States Patent 6,542,211 B1 (to Okada).

As to claims 3, 4, 18, and 19: McMahon does not appear to explicitly specify homogeneous and homeotropic orientations.

Okada has an LCD device and driving method and homogeneous and homeotropic LC orientations (Column 3, Lines 16-40). In Okada, these alignments are useful for providing an LCD with a lower re-bending voltage and lower holding voltage for holding or retaining bend alignment (Column 1, Lines 64-67).

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon in view of Okada for a lower re-bending voltage and lower holding voltage.

Thus, claims 3, 4, 18 and 19 are rejected.

As to claims 5, 6, 20, and 21: It may be implied in McMahon, that an angle between an optical axis of an optical path in the LC layer and the direction of the normal line of the substrate is set to be larger than a total reflection angle upon emanation of the light beam from the substrate into the air given switching structures as taught in McMahon.

Thus, claims 5, 6, 20 and 21 are rejected.

Claims 7, 8, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,278,327 (to McMahon et al.) in view of United States Patent 6,542,211 B1 (to Okada) and further in view of Kitagishi Nozomi (JP-07-318861).

As to claims 7, 8, 22, and 23: McMahon does not appear to explicitly specify that an angle between an optical axis of an optical path in the LC layer and the direction of the normal line of the substrate is set to be not less than a Brewster angle between the substrate and the air.

Nozomi has a polarizing element and projector for which incident light is approximately the same as a Brewster angle with an optical axis (PAJ). In Nozomi, this configuration is used for polarizing and light separating efficiency.

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon in view of Nozomi for polarizing and light separating efficiency.

Thus, claims 7, 8, 22 and 23 are rejected.

Claims 9-12, and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,278,327 (to McMahon et al.) in view of United States Patent 6,542,211 B1 (to Okada) and further in view of United States Patent 6,473,144 B1 (to Ichikawa et al.).

As to claims 9-12, and 24-27: McMahon does not appear to explicitly specify a hologram element (or diffraction grating) for pixels whereby p-polarized light is not substantially diffracted, but an s-polarized light beam generated after modulation by the LC layer is diffracted to a direction substantially perpendicular to the LC element.

Ichikawa has a hologram color filter including a blazed holographic diffraction grating for a hologram that has both a dispersing and converging function or only a dispersing function (Col. 3, Lines 45-53). In Ichikawa, s-polarized light is incident on the hologram color filter (Col. 4, Lines 55-56) and appears to be substantially perpendicular to the LC element (Figure 1). In Ichikawa, the hologram color filter diffractively disperses incident light to emanate light rays in

different wavelength regions at a predetermined spatial period (Col. 2, Lines 53-65) for excellent color reproduction and to prevent uneven color (Col. 5, Lines 5-8).

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon in view of Ichikawa for excellent color reproduction and to prevent uneven color.

Thus, claims 9-12 and 24-27 are rejected.

Claims 14, 15, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,278,327 (to McMahon et al.) and further in view of Tanaka (US 5,895,108).

As to claims 14, 15, 32, and 33: McMahon does not appear to explicitly specify ferroelectric and antiferroelectric material to be used as the liquid crystal material.

Tanaka suggests that an antiferroelectric and ferroelectric liquid crystal may be used because they require a low voltage when switching among antiferroelectric and ferroelectric states (Col. 2, Lines 45-63).

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon in view of Tanaka for reduced drive voltage when switching among various liquid crystal states.

Thus, claims 14, 15, 32 and 33 are rejected.

Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,278,327 (to McMahon et al.) in view of United States Patent 6,542,211 B1 (to Okada) and further in view of United States Patent 6,417,941 B1 (to Inoko).

As to claims 28 and 29: McMahon does not appear to explicitly specify incident and emergent side hologram elements where the incident side hologram diffracts an emergent light beam substantially perpendicular to a substrate and an emergent side hologram diffracts the emergent light beam having a polarization orthogonal to the polarization of the incident light beam.

Inoko has a component of light passing through the first hologram element after diffraction and the polarization directions are perpendicular to each other (Col. 2, Lines 10-31). Inoko has such a configuration for splitting of light with high accuracy and to prevent the unnecessary absorption of light that may internalize to heat (Id.). Such a display is reliable and has a long service life (Id.).

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon in view of Inoko for accurate light splitting without the unnecessary absorption of light and for a display that is reliable and that has a long service life.

Thus, claims 28 and 19 are rejected.

Claims 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,278,327 (to McMahon et al.) and further in view of United States Patent 5,729,306 (to Miyake et al.).

As to claims 34-37: McMahon does not appear to explicitly specify a color separation and color synthesizing optical system; however, Miyake has a light splitting and synthesizing device as illustrated, for example, in Figure 18. In Miyake, the light source optical axis and projection lens are on different levels and parallel (Figure 18 and Figure 35).

Miyake has a polarized beam splitter for splitting a white light into polarized beams having polarizations different from each other (Col. 4, Lines 49-54) corresponding to three primary colors (Col. 17, Lines 44, 51, and 60) and the colors are incident on the LCD panels (Figure 18, LCDs 222, 223, and 224) obliquely on hologram plates (Figure 14).

In Miyake, the invention is directed to a light splitting and synthesizing device for aligning different polarization directions of the light emitted by a light source to prevent chromatic aberration and for a high luminance display that is small and easy to produce (Col. 6, Lines 35-42).

It would have been obvious to one of ordinary skill in the art of liquid crystals at the time the invention was made to modify McMahon in view of Miyake for a splitting and synthesizing device requiring a low drive voltage that can be manufactured easily and that prevents chromatic aberration.

Thus, claims 34-37 are rejected.

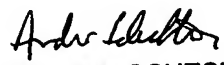
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeanne A. Di Grazio whose telephone number is (571)272-2289. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571)272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeanne Andrea Di Grazio
Patent Examiner
Art Unit 2871

JDG


ANDREW SCHECHTER
PRIMARY EXAMINER